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SERIAL NO.: 10/645,373 EXAMINER: V. RONESI

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TITLE: MULTIFUNCTIONAL DISPERSANTS

Wickliffe, Ohio

Hon. Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. §1.132

I, Suzanne Patterson, declare as follows:

I received a Bachelor of Science degree in 1997 from the University of Arkansas at Little Rock and both a Master of Science degree and Doctoral degree in the field of organic chemistry from The Ohio State University in 1999 and 2003, respectively.

I have been employed by The Lubrizol Corporation since 2003. From 2003 to 2007 I was responsible for the development of viscosity modifiers and friction modifiers while working in the research division. In 2007 I was promoted to Intellectual Property Technology Manager for the driveline group of Lubrizol (including automatic transmissions). I am presently responsible for coordinating the work associated with patents for lubricants for automatic transmissions, continuously variable transmissions, dual clutch transmissions, manual transmissions, and farm tractors as well as gear oils. As a result, I am familiar with

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the invention claimed in the above-mentioned case and with the references which were used in the rejection thereof.

In order to illustrate that dimercaptothiadiazole- and boron-containing dispersants have unexpected performance advantages compared with dispersants that do not contain boron, the following experiments were performed under my supervision.

Two lubricating compositions were prepared as summarized in Table 1 below. The two compositions are identical and represent a typical automatic transmission fluid, differing only in that inventive example EX2 contains a dispersant which has been reacted with both boron and 2,5-mercapto1,3,4-thiadiazole (DMTD), and comparative example EX1 contains a dispersant which has been reacted only with DMTD. EX1 contains boron in the form of an alkyl borate (2-ethylhexyl borate), not reacted with the dispersant, such that boron levels of both compositions are similar. The amount of each component is presented on an oil-free basis, unless otherwise specified in the Table 1.

Table 1

Component (weight %)	Comparative EX1	EX2 (inventive)
Succinimide dispersant reacted with DMTD[a] (40% dil oil);	4.50	—
2-Ethylhexyl borate	0.85	—
Succinimide dispersant reacted with DMTD[a] and boric acid (40% dil oil)	—	4.50
Polymethacrylate viscosity modifier (26.5% dil oil)	8.70	8.70
Aryl amine antioxidant	0.80	0.80
Substituted oxazoline	0.70	0.70
Dibutyl hydrogen phosphite	0.20	0.20
Hydroxyalkyl-substituted thiol	0.20	0.20
Reaction product of fatty acid + polyamine	0.17	0.17
Phosphoric acid (85%)	0.08	0.08
Long chain alkyl hydrogen phosphite	0.06	0.06
Ethoxylated fatty amine	0.05	0.05
1-Hydroxylethyl-2-alkyl-imidazoline	0.02	0.02
Commercial antifoam agents	0.0135	0.0135
Oil of lubricating viscosity	-- balance --	-- balance --

Elemental analysis		
% Boron	0.0239	0.0226
% Phosphorus	0.058	0.0553
% Sulfur	0.0672	0.0654

a. The succinimide dispersant is the condensation product of a 1000 Mn polyisobutylene succinic anhydride reacted with polyamine bottoms and in each case contains 2.25% DMTD on the neat dispersant. For Ex 2, the dispersant is additionally reacted with boric acid and contains 0.83% B on the neat dispersant.

Both the lubricants of comparative Example 1 and inventive Example 2 were analyzed for anti-shudder durability performance using the Variable Speed Friction tester (VSFT). The VSFT test measures the coefficient of friction with respect to sliding speed, simulating the speeds, loads, and friction materials found in automatic transmission clutches. This test correlates to the performance found in actual use in an automatic transmission, and has been described in detail in Society of Automotive Engineers publication #941883. The VSFT test consists of several speed sweeps run at different temperatures to assess the friction performance across a broad range of conditions, followed by a 1 hour aging cycle at constant speed, load, and temperature. This two step cycle is repeated 13 more times (52 hours) which roughly correlates to the service life of a transmission fluid. This test involves plotting the measured coefficient of friction (μ) as a function of sliding speed (V), to obtain what is commonly known as a "μ-V curve." The slope of this curve, measured from V = 50 rpm to V = 200 rpm, is reported for the two formulations in Table 2, measured over the course of 52 hours. Slopes that are positive or only slightly negative are desired. The testing was performed using two standard friction materials (cellulosic-based compositions commonly used in automatic transmissions), as indicated in Table 2.

Table 2.

	friction material SD-1777		friction material D-0530-31S	
hours	**EX1**	**EX2**	**EX1**	**EX2**
0	0	-0.003	0.001	-0.002
4	-0.003	0.001	0	-0.003
8	-0.002	-0.002	-0.003	-0.005
12	-0.001	0.001	-0.003	-0.006
16	-0.002	-0.005	-0.004	-0.005
20	-0.004	-0.004	-0.007	-0.005
24	-0.005	-0.006	-0.01	-0.006
28	-0.005	-0.006	-0.011	-0.005
32	-0.008	-0.002	-0.011	-0.009
36	-0.011	-0.004	-0.011	-0.011
40	-0.013	-0.012	-0.011	-0.012
44	-0.01	-0.012	-0.011	-0.009
48	-0.009	-0.01	-0.012	-0.009
52	-0.006	-0.012	-0.012	-0.011
approx hours at which slope drops below -0.006	30	37	19	29

The results show that the inventive material of EX2 maintains a positive or near zero slope (that is, -0.006 or better) for a significantly longer period of time than does the comparative material of EX1.

I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Suzanne Patterson

Suzanne Patterson

11/30/2007 (date)